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IMAGE-IZER OPERATING INSTRUCTIONS

SETUP

Prior to applying power to your computer ensure that the IMAGE-IZER is properly connected to the computer. You should never connect the digitizer to the computer with power on, as damage can result to your computer!!! The video signal to be digitized should be approximately equal to RS-170 format for composite video. The video output jack on most popular video tape recorders is an excellent source. Live (moving) video sources can be used; however, since the image takes about 3 seconds to be digitized, some distortions may result. The freeze-frame feature on a VTR or a fixed image from a closed-circuit TV camera will give best results.

NOTE: The program disk includes demonstration images. Insert the disk and type LOAD"DEMO",8 and <return> to load program, then type RUN and <return> to view sample images.

OPERATION

1) Before applying power to computer, connect the digitizer board to the user I/O port located in the back of the computer on the left side.

2) Connect video cable from video source output to input jack (J1) in the digitizer assembly.

3) Power up your computer, insert the program disk and type LOAD"VIDEO",8 and <return>. SX-64 users only; LOAD"SXVIDEO",8 and <return>.

4) After loading is complete, type RUN and <return>.

5) The digitizer will display "loading" message and then a MAIN MENU

6) Follow the MAIN MENU commands as detailed on page 3.

NOTE: If no video signal is being applied to the digitizer, the screen will go black and the computer will not respond to the keyboard. Simultaneously depress the RUN/STOP & RESTORE keys if you wish to regain control of the computer. The digitizer demands every microsecond of processing time available, so the keyboard is disabled for some of the operations. To enable a key input you must be patient and wait for the program to get around to you! Usually the delay is under 3 seconds - however, the key must be continuously depressed until sensed.

MAIN MENU

<A> Selects 8 grey levels

<B> Selects 6 grey levels

<C> Selects 4 grey levels

<D> Switches the screen display to the present image in memory. If option D is selected prior to image capture, a random pattern will be displayed. Select M to return to the Main Menu

<W) Selects 2 grey levels - useful for special high contrast images such as lettering

<X> Selects 3 grey levels - (bit pattern 10 is not used) - provides more flexibility for KOALA users

<Y> Selects 5 grey levels - (bit pattern 10 is not used)

<Z> Selects 7 levels - provides the best quality screen dumps when using DOODLE or PRINTSHOP graphics programs

<M> MAIN MENU - used to return to the MAIN MENU after image is displayed

<F> FILE MENU - when selected from the MAIN MENU, F exits the machine language program and presents a FILE MENU which allows several additional operations as described on Page 4.

<F1> ADJUST mode - used to obtain quick real time adjustment of contrast and brightness. Do not attempt to save images obtained while in adjust mode as they will be distorted due to the internal design of the computer.

<F3> HOLD mode - used after adjustments are completed to freeze image in memory for viewing or saving to disk. When F3 is selected, the system will blank the screen to the border color for the duration of the process (about 3 seconds). The digitized image will then appear and remain until F1, F3, F5, F or M is selected.

<F5> REPEAT mode - used like F3 to capture images but repeats the digitizing process after a brief display of the captured image. To stop operation when you wish to save or examine an image continuously, depress the M key - the program will return to MAIN MENU.

FILE MENU

SAVE FORMAT SELECTION

<S> Save Standard image file to disk

<K> Save KOALA image file to disk

<P> Save Printshop image file to disk

<D> Save Doodle image file to disk

<N> Save NEWSROOM photo file to disk

ADDITIONAL FEATURES - FILE MENU

<Z> Permits review of disk directory

<L> Loads image file (standard format only)

<M> Returns to MAIN MENU

<C> Used to select PSEUDOCOLOR MENU

NOTES:

<S> Saves image as a program file 32 blocks long. Image memory at locations $6000-$7F3F is saved. The save uses conventional filenames.

<K> Saves the image bitmap, screen and color memory in the proper format, locations and filename to be read back under the KOALA drawing program. This allows you to digitize images and later modify them using the KOALA program! The digitizer program will insert the special first character and pad the name with spaces for you, but you MUST enter the PIC A name format sequence. Do not go out of alphabetical order on the disk directory. (PIC A...PIC B...PIC C...etc.). Use the Z key to list the present disk directory to verify the filenames and sequence on the disk before using the KOALA save feature.

<D> Saves the image bitmap and screen memory for recall in Doodle format and locations. The first two letters of the filename (DD) are automatically inserted. Best results for printing of images under Doodle are obtained with the 5 or 7 grey level modes.

<P> Saves the image bitmap in the proper locations for recall using Printshop. The 5 or 7 grey level modes generally produce the best screen printouts when using Printshop.

<N> Converts and saves images into a format compatible for use in Newsroom's photo lab. To use a digitized image saved using the N option, load it to Newroom using the Photo Lab's "load a photo" mode. Please note that the sequential steps as detailed by Newsroom must be followed exactly to incorporate the image into a form usable by the Layout Editor.
The image should be digitized using the 5 or 7 grey level mode (key Y or Z) for the best results.

<Z> Provides listing of disk directory for the disk currently in your drive. Note that the disk name is the at the top of the list.

<L> Loads a standard image from disk into display memory for viewing.

<M> Restarts the operational digitizer. The main IMAGE-IZER menu is displayed.

<C> Allows user to assign colors to various grey levels. Please note that this method of grey level to color substitution is not true color - hence the name PSEUDOCOLOR. A selection menu is provided for coloring, as well as a display capability. Once colors are modified, the digitizer will continue to capture images using the new coloring selection. Image saves to disk will only contain the bit map data (no colors are saved).
The Commodore permits 4 colors to be selected in the 160 X 200 multi-color mode used by the digitizer. When C is selected from the FILE MENU, the PSEUDOCOLOR MENU screen is displayed with a color number chart.

PSEUDOCOLOR MENU

Standard Color Values:

```
Background = 0  Black
Hi Nibble  = 11 Grey 1
Lo Nibble  = 12 Grey 2
Color      = 15 Grey 3
```

For best results, follow the dark to light suggested value sequence. Old fashioned "TINTYPE" coloring may be obtained by using the following values;

```
Background = 9
Hi Nibble  = 10
Lo Nibble  = 7
Color      = 15
```

For an all blue effect;

```
Background = 11
Hi Nibble  = 6
Lo Nibble  = 14
Color      = 3
```

For reverse image;

```
Background = 1
Hi Nibble  = 15
Lo Nibble  = 12
Color      = 11
```

<Y> Change colors

<D> Display current image with color changes

<space bar> Return from image display to PSEUDOCOLOR MENU

<M> Main menu

<F> File menu

GENERAL NOTES

SAVING TO DISK:

You must insert a correctly initialized disk with sufficient room (at least forty blocks) for an image save. Ensure that you are saving the image in the correct file format for the particular graphics program you will be using. If you should happen to "BREAK" out of the BASIC portion of the program simply type RUN20 to restart without a complete reload. Your image in memory will not be lost.

USE OF SAVED IMAGES WITH OTHER GRAPHICS PROGRAMS:

BASIC

Study the program listing on page 14. It is a sample listing of the graphics subroutines needed in BASIC to display saved images. You may also load the DEMO program included on the program disk and examine how several images are loaded from disk. To load your digitized images (standard format only) using the DEMO program simply define Z$ as the title of your image.
Example: Add line 156 Z$="MYIMAGE":GOSUB200

DOODLE

To load a digitized image file from disk under Doodle, use the Doodle C2 command for disk load. Your image filename should appear as a Doodle. After loading, use the color F2 negative and home keys to restore image contrast. You may now modify the digitized image under Doodle, return to the C2 command and print as you would any other Doodle image.

PRINTSHOP

To load a digitized image file from disk, select the "screen magic" option of Printshop. Use the "get" command to load the image. Follow the Printshop commands to print out the image as a negative or a positive. You may use Printshop to add lettering to the image prior to printout.

KOALA

To load a digitized image file from disk select disk operations on the KOALA screen. Your image filename should appear on the disk directory display. Select the "get" function and load the image. After loading, you may return to the Koala main menu for graphical modification of the digitized image.

NEWSROOM

To load a digitized image file from disk under control of Newsroom, select the Photo Lab option of Newsroom. Use the disk operation "load photo" to load the digitized image. The image file appears as a PH. file to Newsroom and is recognized as a photo. The PH. prefix was automatically inserted for you by the IMAGE-IZER Newsroom save process. You must carefully follow the sequence of steps detailed by Newsroom to have the photo appear on the Layout Editor listing. Follow the Newsroom sequence of "Photo Lab" to "Copy Desk" to "Layout" for proper incorporation of the photo. The digitized photo is a full

panel in size. Remember to use the 5 or 7 grey level mode of the IMAGE-IZER to provide the best printout quality with Newsroom.

SCREEN DUMPS

Due to the tremendous variety of printers and interfaces, we do not include screen dump software. The dump routines in Printshop, Newsroom, and Doodle will provide hardcopy capability for a large variety of printers.

MEMORY USAGE AND COLOR INFORMATION

The machine language portion of the IMAGE-IZER program is located at $C000 to $CFFF. Screen memory is at $5C00 to $5DE7 and initially contains $BC. This value is modified in the PSEUDOCOLOR MENU by changing the hi or lo nibble values. Standard color memory is used ($D800 to $DBFF) and initially contains $01. Background color ($D021) is initially $00. All displays are in the 160 X 200 multi-color bit map mode. Refer to the Commodore 64 Programmer's Reference Guide, pages 127-128 for additional information.

BOARD 2 3/4" x 3 3/4"

PARTS LIST

RESISTORS

1	- 470k 1/4 watt 5%	
4	- 100k "	
14	- 22k "	
6	- 10k "	
1	- 4.7k "	
6	- 2.2k "	
2	- 220 ohms "	
1	- 68 or 82 ohm "	

CAPACITORS

3	- 22mfd elec., 25vdc vert. mount	RS#272-1026
3	- .1 disc. 12wvdc 20%	RS#272-135
5	- .01 disc. 12wvdc 20%	RS#272-1065
3	- 39 (or 47) picofarad disc 20%	RS#272-121

I. C. TRANSISTORS

ITEM	RADIO SHACK NUMBER
3 - NPN (Q1, Q3, Q4) 2N3904 or equiv.	RS#276-1603 or 276-1617
1 - PNP (Q2) 2N3906 or equiv.	RS#276-1604
2 - CMOS 7555 timer 8 pin dip U1 & U4	RS#276-1718 or 276-1743
1 - LM 324 quad op amp (U2)	RS#276-1711
1 - CD4066 CMOS quad switch (U3)	RS#276-2466

POTS

ITEM	RADIO SHACK NUMBER
1 - 100k (VR1 - contrast)	RS#271-220
1 - 100k (VR4 - rate) min pc mount	RS#271-338
1 - 10k (VR2 - bright)	RS#271-218
1 - 10k (VR3 - width) min pc mount	RS#271-335
1 - 10k (VR5 - coarse) min pc mount	RS#271-335

(J2) I/O CONNECTOR

1 - 24 contact, 12 position .156 center
AMP# 530667-3 8136
CINCH# 251-12-90-160 (50-24EE-30)
DIGI-KEY part number C1-12
$2.90 + $2.00 shipping and handling
(refer to their catalog for more information)
DIGI-KEY CORP.
701 Brooks Ave. South, P.O. Box 677
Thief River Falls, Mn. 56701
Phone: 1-800-344-4539

SOCKETS

Recommended for (U2) and(U3) RS#276-1999

VIDEO INPUT CONNECTOR

(J1) - Video input connector (RCA audio jack = RS#274-346

NOTE: RS# indicates that this is the Radio Shack number for this component

VIDEO DIGITIZER ASSEMBLY, ALIGNMENT, AND TROUBLESHOOTING INSTRUCTIONS

THEORY OF OPERATION

The digitizer operates by using a synchronized sampling process. The incoming video signal is sampled at a certain point on each horizontal line. The digitizer slowly sweeps this sampling point from left to right across the picture (aprox. 3 seconds). This results in a vertical column of pixels being sampled at a rate of one vertical column every 16.667 ms. The computer reads the sampled data (collected in vertical columns) and converts the data into a bit mapped image under software control (refer to the digitizer schematic). The bilateral switch U3, is switched in response to each horizontal sync pulse as delayed by the time duration of one shot U1. The video sample and hold function is performed by the switch action of U3 and a small capacitor buffered by a section of U2. The length of the delay of U1 is modulated by the charging capacitor time constant formed by the rate pot, 1 100k resistor and a 22 microfarad capacitor. This long time constant (approx. 4 seconds) controls the left to right sweep of the sampling across the video image as the delay value of U1 is altered. Transistors Q2 and Q1 are sync-separator buffers with a part of U2 performing as a vertical sync filter which drives output transistor Q3. The vertical sync and horizontal sweep processes are controlled by Q4. If Q4 is turned on, the digitizer is in operation. Q4 must be turned off to reset the process before another picture can be digitized. The computer, under software control, determines which level to apply to the base of Q4 via pin D. The sampled video is buffered by a section of U2 which then drives the modulation input of timer U4. U4 is configured to provide a variable pulse width (pin 6) to the computer I/O input port in response to a trigger from the I/O port (pin 8). The computer determines the value of grey scale based on this pulse width. The computer also determines when to start a new vertical column by sensing the level as provided by Q3 (vertical sync) as seen on pin C.

ASSEMBLY

The sequence of assembly should be the jumpers first, followed by fixed resistors, and then the IC's. The capacitors and the variable resistors should be last. MAKE SURE TO USE ONLY HIGH QUALITY ROSIN CORE ELECTRONIC SOLDER. Carefully clean the board of all flux after soldering.

CHECKOUT & TROUBLESHOOTING

Prior to connection of the digitizer to your computer, double check for bad solder joints or solder bridges. Make sure resistors are of correct value; be particularly careful about mixing 220k, 2.2k and 22k resistor values! Use an ohmeter to verify that the V+ line is not shorted to ground. After you are confident that everything is correct, connect the digitizer and load the digitizer program using the procedures detailed on page one of this manual.
Once this is accomplished, select the 4 grey level mode and F1 (adjust mode). The program will now cycle the digitizer. When looking for signals, remember that Q4 is turning on and off every 3 seconds. The vertical sync pulse on the collector of Q3 (J2 pin C) must be present - occasionally insufficient gain of Q1 and Q2 will occur - this is addressed by changing the value of the 100k resistor across pins 1 and 2 of U2 to 220k. Make sure the sync signal input is correct (approx. 1 volt) before adjusting. Improper or no vertical sync pulse will cause the digitizer to stop completely. If the vertical sync is erratic, the digitized image will have a very noticeable vertical jagged effect. Correct operation of U1 can be seen on pin 3 of U1 as a varying width pulse, starting in sync with the horizontal sync pulse. If horizontal or vertical sync is faulty, check Q2 and Q1 first, as they are the sync-separator buffers. When operating correctly, the voltage on pin 5 of U4 will be 3.3 +/- 1 volt nominally. The timer U4 responds to trigger pulses from the computer with a variable pulse width (less than 50 microseconds - determined by VR5 and the incoming video signal). If the horizontal sweep appears nonlinear, try changing the 22 microfarad cap on pin 12 of U2 (leakage will cause nonlinearity).

Approximate resistance settings for the pots are as follows;

VR1 manually adjust for best image contrast
VR2 manually adjust for desired brightness
VR3 width - 1k to 5k
VR4 rate - 5k to 15k
VR5 coarse brightness - 600 ohms to 1.4k

TROUBLESHOOTING HINTS

The most common assembly error is improper resistor value and missing components. Recheck resistors carefully, as the red, brown, and yellow bands are easily confused! Double check capacitor values. One other problem that may occur is conductive flux. You MUST clean the board of flux after soldering.

No apparent operation - screen goes black and stays black. Check to be sure that Q2 is a PNP transistor. Check for correct sync and video input. Check with an oscilloscope for sync pulses on J2 pin C into the computer.

Image is very compressed or unnaturally elongated - probably caused by improper setting of VR3 and/or VR4. May also be caused by defective cap on pin 12 of U2 (22mfd.).

Very coarse dot patterns can be caused by misalignment of VR5 or by the use of a bi-polar 555 timer instead of the CMOS 7555 timer. Ensure that you have installed CMOS 7555 timers!!!!

ALIGNMENT

1) Set all pots to mid-rotation (except contrast): Set contrast to minimum resistance between pins 8 & 9 of U2.

2) Apply a known good source of RS-170 composite video which contains lettering or a pattern which can be referenced for scan width and centering. (Movie title, weather maps, phone numbers etc.)

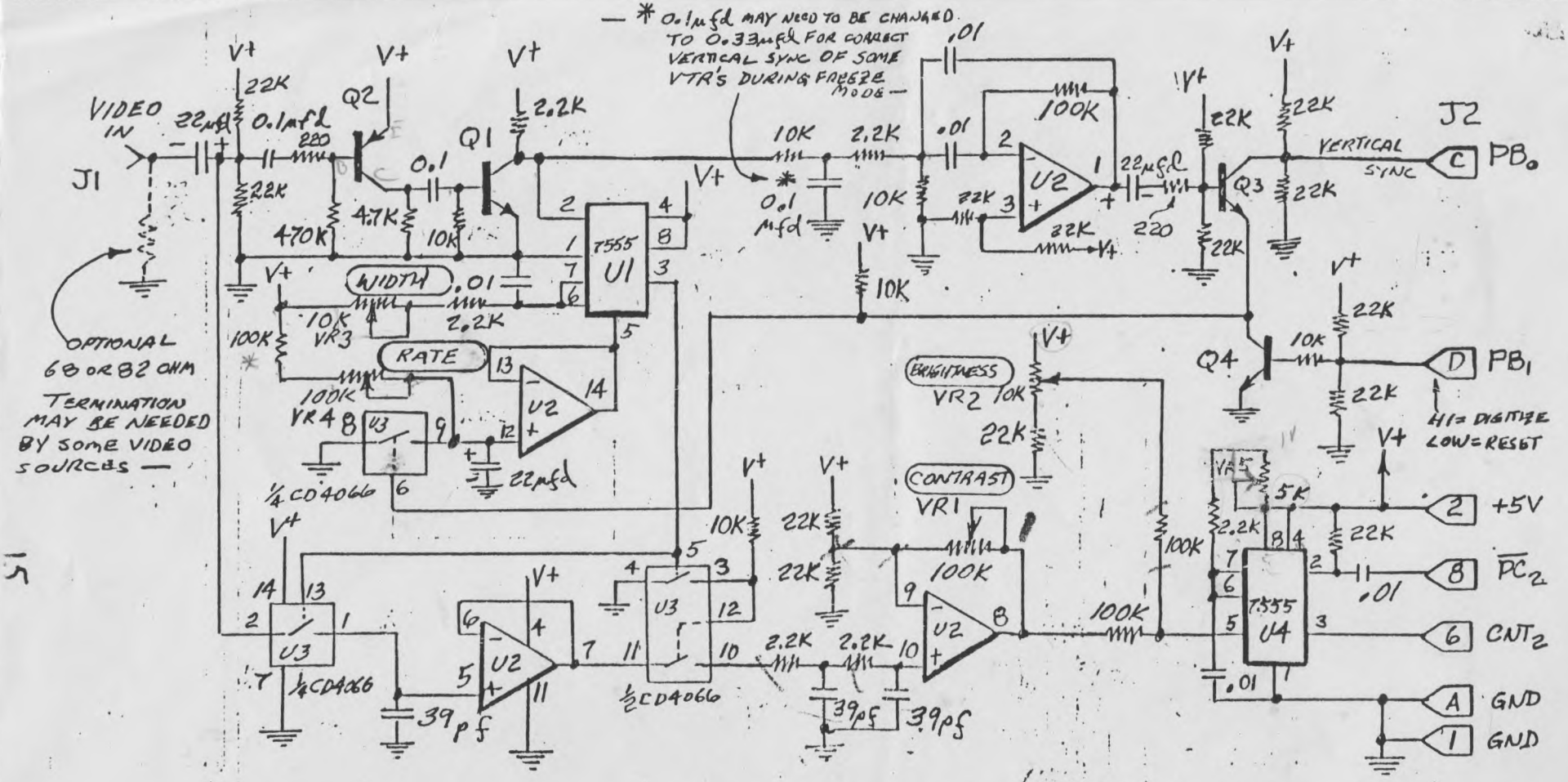
3) Operate the digitizer in adjust mode (F1). Carefully and slowly turn coarse brightness pot VR5 until mid-grey scale image is apparent (use "C" mode). Approximate resistance of 600 ohms to 1.4k measured from wiper to active end of pot. The grey level pattern should be nearly consistent with only a few black speckles. Very coarse herringbone patterns indicate improper setting of VR5 or improper components in the associated circuitry.

4) Slowly adjust rate control VR4 to obtain a total image which matches the input pattern. It is necessary to effectively clip the extreme left and right sides of the image to obtain the best horizontal linearity. Minor adjustment of VR3 may also be used to obtain the best results (VR3 and VR4 are interactive and have very similar effects). Your final settings will match most home television images in scan width and centering.

5) Once correct alignment is accomplished, refer to page one of this manual for operation instructions.

```
5000 REM*SUBR TO LOAD BITMAPPED IMAGE
5002 PRINTCHR$(147)
5003 PRINT:PRINT:PRINT
5005 INPUT"IMAGE FILENAME";Z$
5006 IF Z$="" THEN 20
5012 PRINTCHR$(147)
5014 PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT
5016 PRINT"    PLEASE STANDBY FOR 30 SECONDS"
5017 PRINT:PRINT
5018 PRINT"    WHILE I LOAD  ";Z$
5019 PRINT:PRINT:PRINT"    PRESS SPACE BAR TO GO ON AFTER IMAGE"
5020 OPEN 1,8,0,Z$
5030 POKE185,0:POKE780,0:POKE781,0:POKE782,96:SYS65493
5040 CLOSE1
5050 RETURN
6000 REM SUBR TO SETUP GRAPHICS
6002 PRINTCHR$(147)
6004 PRINT:PRINT:PRINT:PRINT:PRINT"    PLEASE STANDBY FOR 20 SECONDS"
6005 PRINT:PRINT"    WHILE I SET UP SCREEN & COLOR MEMORY":PRINT:PRINT:PRINT:PRI
NT
6006 PRINT "   TO  GO  ON AFTER VIEWING IMAGE"
6008 PRINT"   PRESS SPACE BAR...."
6010 REM NORMAL VALUES:A=0: B=188: C=15
6031 REM*** A=BACKGND B=SCREEN C=COLOR
6032 A=PEEK(49524):B=PEEK(49437):C=PEEK(49529)
6035 POKE 53281,A
6036 SYS 49184
6037 GOTO 6070
6038 REM ***IMPORTANT NOTICE***
6039 REM DELETE LINES 6036 AND 6037 WHEN USING IN OTHER BASIC PROGRAMS!
6040 FOR I=1 TO 1000
6050 POKEI+23551,B
6060 POKEI+55295,C
6065 NEXTI
6070 POKE 56576,(PEEK(56576)AND 252 OR 2)
6071 POKE 53265,PEEK(53265) OR 32
6072 POKE 53270,PEEK(53270)OR16
6073 POKE 53272,PEEK(53272) AND 7 OR 120
6075 GET K$:IF K$="" THEN 6075
6080 RETURN
7000 REM*SUB TO RESTORE TEXT DISPLAY
7010 POKE56578,PEEK(56578)OR3
7020 POKE 56576,(PEEK(56576)AND252)OR3
7030 POKE 53265,PEEK(53265)AND223:POKE 53270,PEEK(53270)AND239
7040 POKE 53272,21:POKE 53281,246
7050 RETURN

READY.
```



VIDEO DIGITIZER
COMMODORE-64

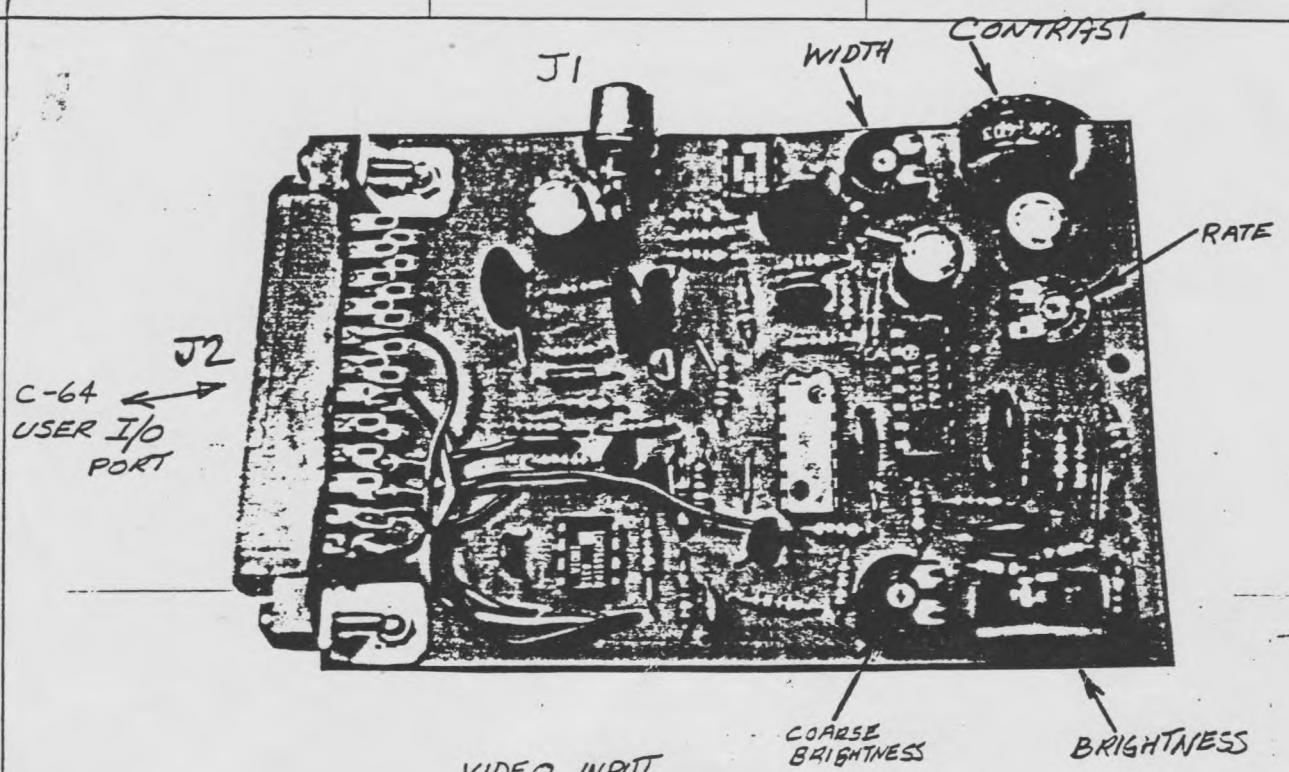
U1, U4 = 7555/TLC555 TIMER, LOW POWER
U2 = LM324 QUAD OP AMP
U3 = CD4066 QUAD BI-LATERAL SWITCH OR EQUIV.
Q1, Q3, Q4 = 2N3904 NPN
Q2 = 2N3906 PNP

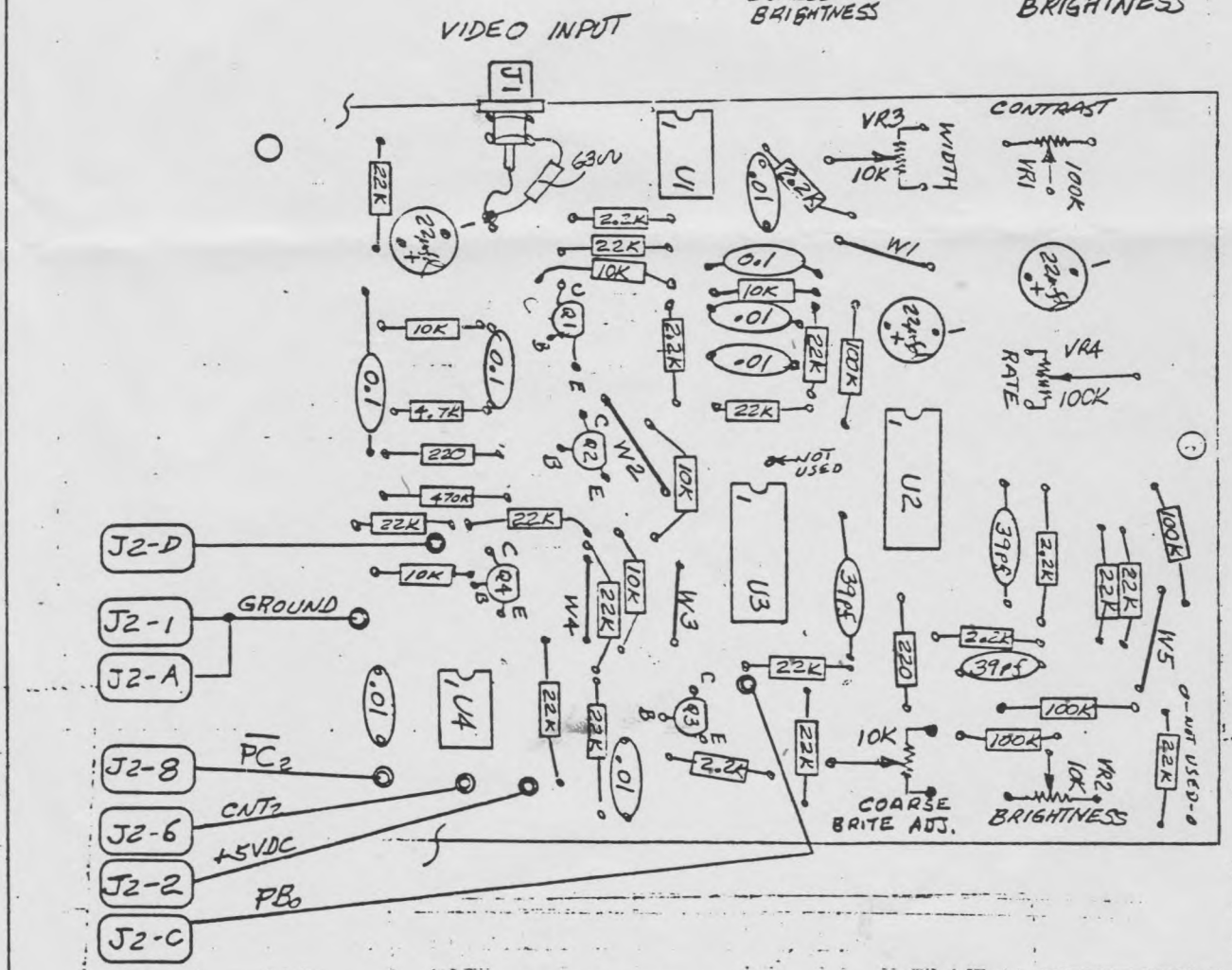
NOTE: V+ = +5 VOLTS DC FROM PIN 2

J2, ⬠ = COMMODORE 64 USER I/O CONN.

**** C64VDITZ ****
C-64 VIDEO DIGITIZER
by KINNEY SOFTWARE
121N HAMPTON RD DONNELSVILLE OH

(C) 1985 DICK KINNEY





COMPONET LAYOUT
COMMODORE 64 VIDEO DIGITIZER

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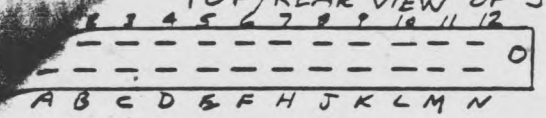
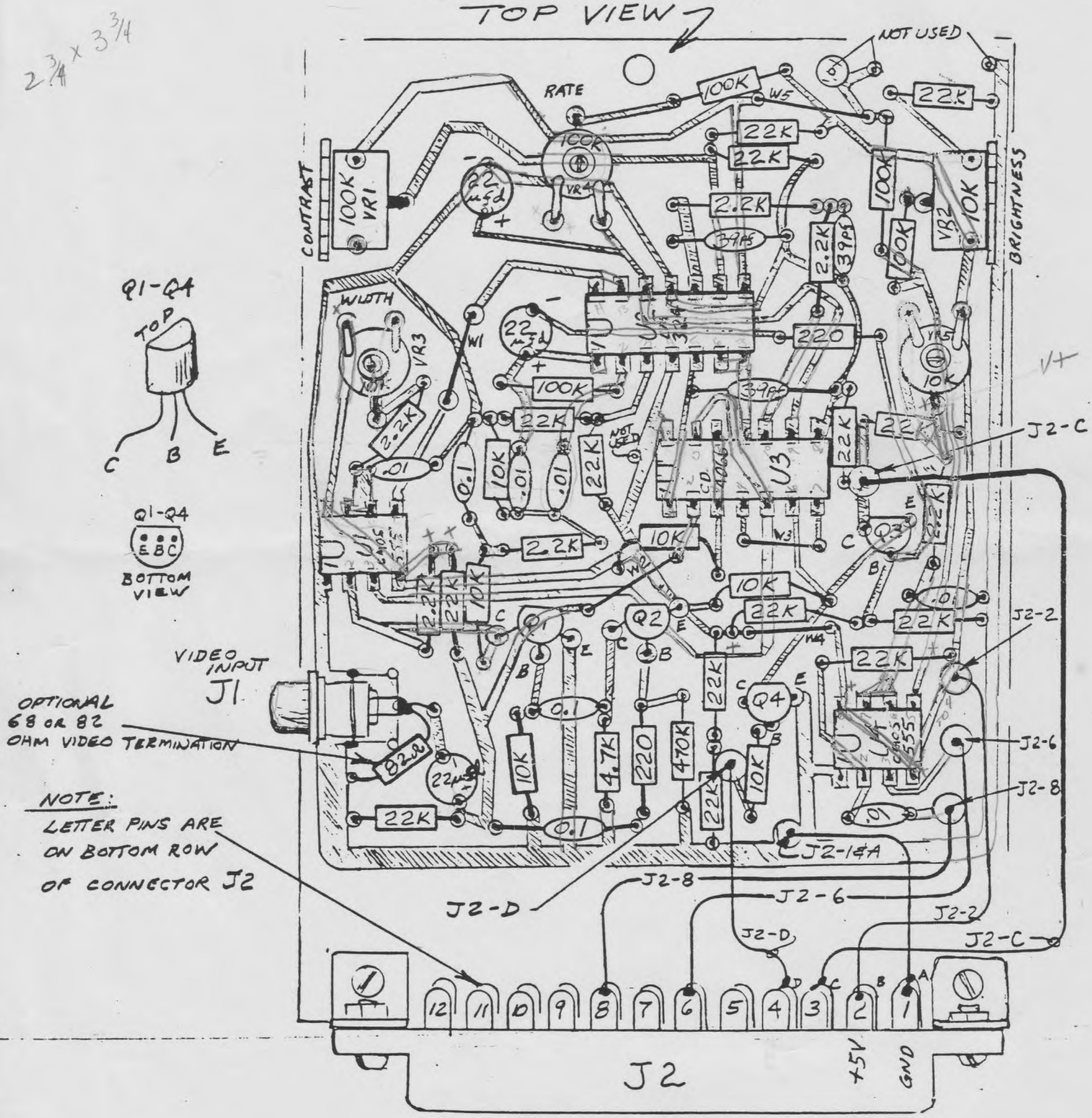
TOP/REAR VIEW OF J2 (SOLDER TABS TOWARD YOU)



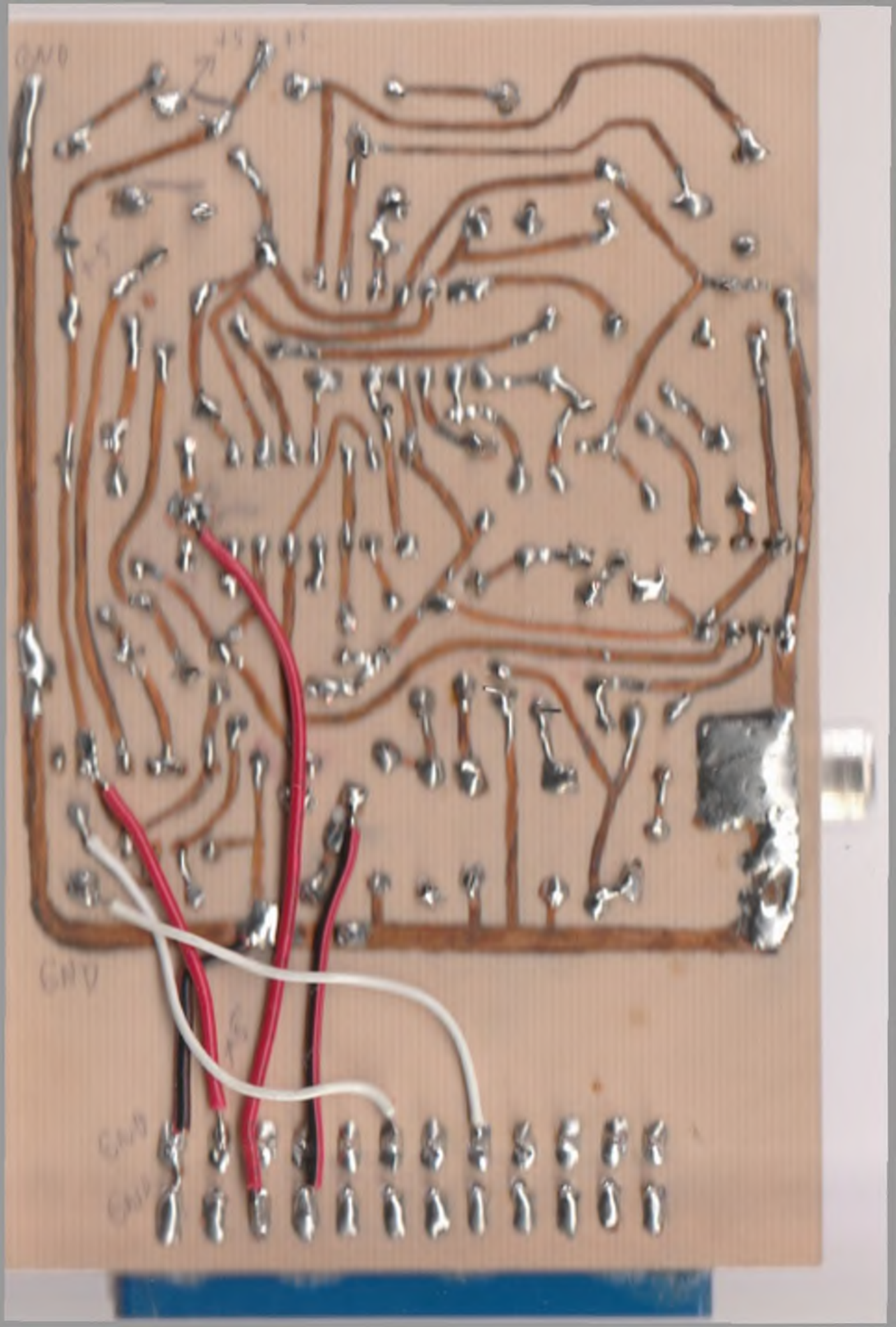
BOTTOM

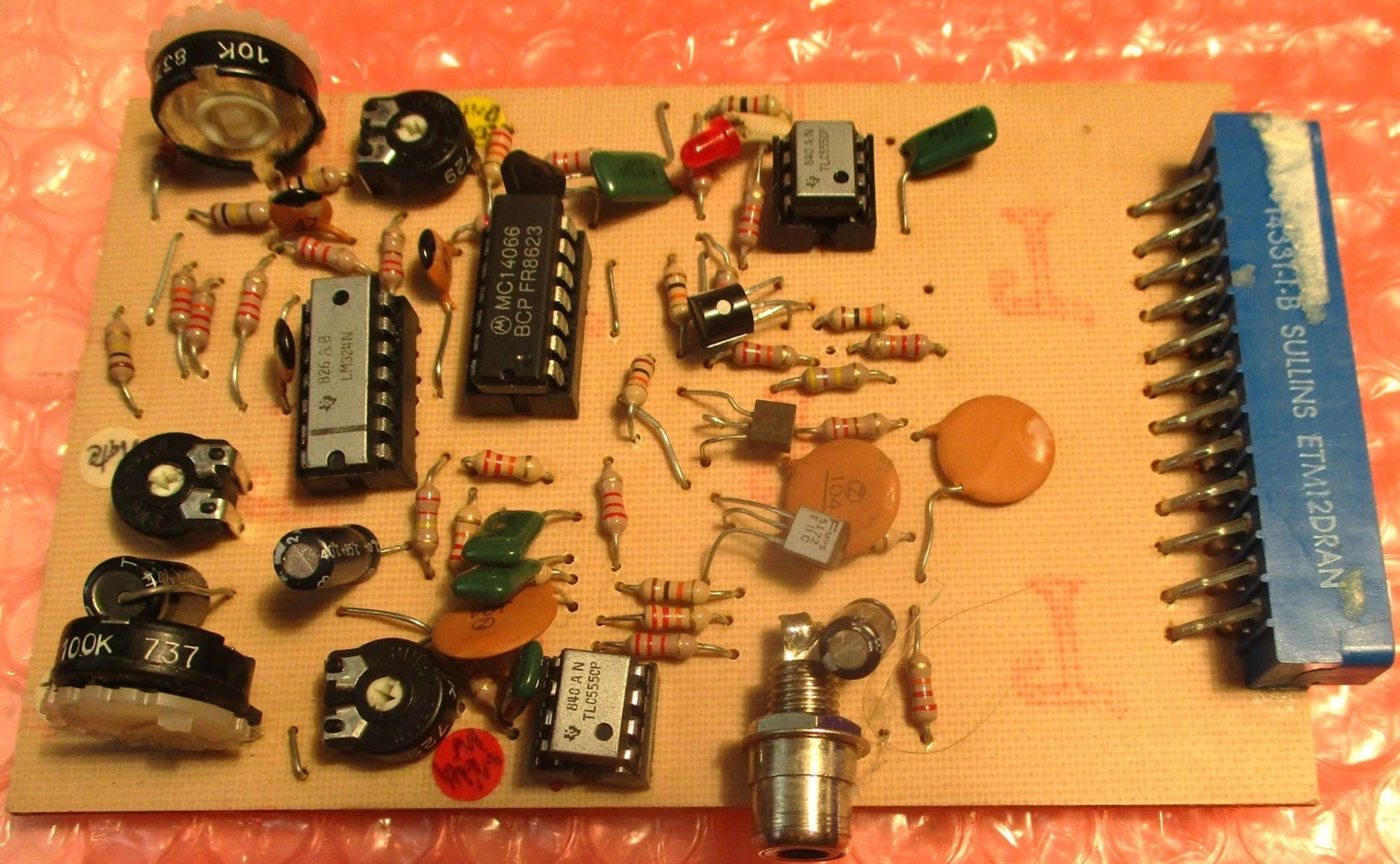
COMPONENT LAYOUT TOP VIEW

2 3/4 x 3 3/4



TOP VIEW




10K
MC14066
BCP FR8623
LM324N
TLC555CP
100K 737

!!VIDEO!!

IMAGIZER

LOAD"VIDEO",8

BACK=PICTURE STORAGE DISK

REQUIRES SOME KNOWLEDGE
OF ELECTRONICS AND
SOLDERING SKILLS!!

USES ALL RADIO SHACK PARTS!